SECOND FIVE-YEAR REVIEW REPORT
D'IMPERIO PROPERTY SUPERFUND SITE
ATLANTIC COUNTY, NEW JERSEY

Prepared by

U.S. Environmental Protection Agency
Region 2
New York, New York

August 2014

Approved by:

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Date: August 1, 2014

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Executive Summary

This is the second five-year review (FYR) for the D'Imperio Property Superfund site located in Mays Landing, New Jersey. The purpose of this FYR is to review information within the last five years to determine if the remedy continues to be protective of human health and the environment. The triggering action for this policy FYR was the first FYR signed on July 31, 2009.

The previous FYR did not identify any issue or make any recommendation because the remedy is expected to be protective of human health and/or the environment, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.

Excavation and removal of waste material and contaminated soils have reduced the source of groundwater contamination. Long-term monitoring indicates the groundwater extraction, treatment and reinjection system is effectively remediating the three aquifer plumes (Bridgeton, and Upper and Lower Cohansey). The groundwater plumes have been defined and no drinking wells are installed within the area of the plumes. The remedy was amended to include vapor extraction and treatment of contaminants from the subsurface soil which continues to reduce the source of contamination to the groundwater. Performance monitoring indicates the soil remedy is effectively remediating the contaminated subsurface soils. A Classification Exemption Area and Well Restriction Area (CEA/WRA), which restricts groundwater wells within the area of the plume, was included as a component of the remedy by the Explanation of Significant Difference (ESD) issued in 2010.

The five year review concluded that the remedy currently protects human health and the environment.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: D'Imperio Property Superfund Site		
EPA ID: NJD980529416		
Region: 2	**State:** NJ	**City/County:** Mays Landing/Atlantic

SITE STATUS	
NPL Status: Final	
Multiple OUs? No	**Has the site achieved construction completion?** Yes

REVIEW STATUS
Lead agency: EPA ***[If "Other Federal Agency", enter Agency name]:*** Click here to enter text.
Author name (Federal or State Project Manager): Michael Zeolla/Remedial Project Manager
Author affiliation: EPA
Review period: 7/31/2009 - 7/31/2014
Date of site inspection: 4/2/2014
Type of review: Policy
Review number: 2
Triggering action date: 7/31/2009
Due date *(five years after triggering action date)*: 7/30/2014

Sitewide Protectiveness Statement	
Protectiveness Determination: *Protective*	*Addendum Due Date (if applicable):* Click here to enter a date.
Protectiveness Statement: *The remedy at OU1 is protective of human health and the environment, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. Excavation and removal of waste material and contaminated soils have reduced the source of groundwater contamination. The groundwater plumes have been defined and no drinking water wells are installed within the area of the plumes. Long-term monitoring indicates that the groundwater extraction, treatment, and reinjection system is remediating the three contaminated aquifers (Bridgeton, Upper and Lower Cohansey). In addition, periodic performance monitoring indicates the vapor extraction and treatment of contaminates in the subsurface soil continues to reduce the source of the groundwater contamination.*	

Introduction

The purpose of a five-year review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy is and will continue to be protective of human health and the environment and is functioning as intended by the decision documents. The methods, findings, and conclusions of reviews are documented in the FYR. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

This is the second five-year review for the D'Imperio Property Superfund site (site), located in Mays Landing, Atlantic County New Jersey. This FYR was conducted by the United States Environmental Protection Agency (EPA) Remedial Project Manager (RPM) Michael Zeolla. The review was conducted in accordance with the *Comprehensive Five-Year Review Guidance*, OSWER Directive 9355.7-03B-P (June 2001). This report will become part of the site file.

The triggering action for this policy review is the completion date of the previous FYR. A five-year review is required at this site due to the fact that the remedial action will not leave hazardous substances, pollutants or contaminants on site above levels that allow for unlimited use and unrestricted exposure, but requires five or more years to complete. The site consists of three components, addressed under one operable unit (OU). The FYR will evaluate all components under this OU.

Site Chronology

See Table 1 for the site chronology.

Background

Physical Characteristics

The site is located within a triangle formed by the intersections of U.S. Route 322 (Black Horse Pike), U.S. Route 40 and Cologne Avenue in Mays Landing, Atlantic County, New Jersey. It includes a 15-acre parcel of undeveloped property identified as Block 1134, Lot 3.03 on the tax map. Within the parcel is an inactive waste disposal dump that encompasses an area of approximately 1 1/2 acres where wastes were illegally disposed. A trailer is utilized on the property and a private fence restricts access to the site.

The site is situated in a semi-rural region of Atlantic County within the New Jersey Pinelands National Reserve. This designation allows for commercial, industrial and moderately high residential development. Several commercial businesses surround the site and many residential developments exist in the area. The nearest surface water bodies are two wetlands to the north and south of the site, approximately 2,000 and 4,000 feet away, respectively. The northern wetland is named Babcock Swamp and is drained by Babcock Creek which is tributary to the Great Egg Harbor River. The southern wetland is unnamed and is drained by Gravelly Run, which is also a tributary to the Great Egg Harbor River.

Site Geology/Hydrogeology

The site, located within the Atlantic Coastal Plain Physiographic Province, consists of seven stratigraphic units which are described as follows, in descending order, the undifferentiated Bridgeton (6 to 26 feet thick), the Middle Bridgeton "Clay" (2 to 12 feet thick), the Bridgeton Sand (2 to 47 feet thick), the Lower Bridgeton "Clay" (1 to 26 feet thick), the Upper Cohansey

Sand (7 to 45 feet thick), the Middle Cohansey "Clay" (0 to 28.5 feet thick) and the Lower Cohansey Sand (78 to 87 feet thick).

The Kirkwood underlies the Cohansey Sand and consists of silt and clay. The Bridgeton Sand, Upper Cohansey Sand and Lower Cohansey Sand are the primary aquifer units underlying the site; they are capable of sustaining high water yields suitable for residential, industrial and agricultural purposes. These aquifer units are bounded by aquitards, defined as the Middle Bridgeton Clay, Lower Bridgeton Clay and Middle Cohansey Clay. The aquitards provide partial confinement and hydraulic separation between the aquifer units. Because the Cohansey Sand is porous and permeable, it is easily recharged by precipitation and provides several hundred gallons per minute to production wells. The Middle Cohansey Clay influences the groundwater at a depth of about 50 feet, but quickly thins out towards the northwesterly direction.

Land and Resource Use

The land use in the vicinity of the site is classified as a Regional Growth Area. This designation allows for commercial, industrial and moderately high residential development. Several commercial businesses surround the site. In addition, a number of residential developments exist in the area. One housing development is located approximately 300 feet west of the site. Two adjacent properties are being considered for development – one as a commercial strip mall to the northwest, and the other for residential housing to the south. There are no current plans for reuse of the site property.

History of Contamination

The D'Imperio family has owned this property since 1968. The property had been used by the Lightman Drum Company (LDC) Inc., and Jerome Lightman as a site for illegal dumping of hazardous waste material beginning in mid-1974 through 1976. The disposal area consisted mainly of partially buried and ruptured metal drums. Many of the drums contained metals and various organic compounds including solvents. The groundwater is contaminated and a plume has been identified in several aquifers.

During the 1970s, LDC and Jerome Lightman were engaged in the business of reconditioning steel drums and transporting hazardous waste material. LDC would pick up drums containing hazardous substances from a number of generators, and transport the waste material to numerous unauthorized disposal sites. The generators of this waste material, along with LDC and Jerome Lightman, have been identified by EPA as potentially responsible parties (PRPs) for this site.

In the late 1970s, the Atlantic County Public Health Department learned of the illegal waste disposal area behind the Dennis Motel (a motel located east of the D'Imperio property) and informed the New Jersey Department of Environmental Protection (NJDEP) of its existence.

Initial Response

NJDEP believed the disposal area was part of the motel property, and directed the Dennis Motel to investigate and dispose of the waste material. The motel did not comply with this directive from NJDEP. In 1980, a limited field investigation conducted by a potential developer of the property indicated that the groundwater underlying the site was contaminated with volatile organic compounds (VOCs). Subsequently, NJDEP performed a more thorough investigation. EPA was notified by the NJDEP of the existence of the waste disposal area in 1981. In early 1982, EPA began an investigation of the site and a Remedial Action Master Plan (RAMP) was completed in August 1982. This report summarized the existing data and identified tasks

necessary to complete a Remedial Investigation and Feasibility Study (RI/FS). EPA installed a security fence around the property in 1982 and the site was placed on the National Priorities List of Superfund Sites (NPL) on September 1, 1983.

Basis for Taking Action

From September 1983 to February 1985, EPA performed an RI/FS to delineate the nature and extent of contamination at the site and to develop the remedial alternatives addressing the contamination found within the soils and groundwater. The investigation indicated that the waste disposal activities had resulted in groundwater contamination in the Bridgeton and Cohansey aquifers. The Cohansey aquifer is a source of drinking water for the area. In addition, the soils adjacent to and underlying the disposal area were also found to be contaminated. A human health risk evaluation was performed as part of the RI, and the results identified high levels of VOCs, including 2-butanone (MEK), 1,2-dichlorethane, ethylbenzene, trichloroethene, and toluene, and metals as contaminants of concern in the groundwater; and base neutrals, acid compounds, and volatile organics in the soils. The risk assessment concluded that the potential risks to human health and the environment associated with the source material are direct contact with the contaminated soils and continued migration of contaminants to the groundwater. Also, an ecological risk evaluation was completed as part of the remedial alternative screening process. These results were finalized in a 1986 RI/FS Report for the site.

Remedial Actions

Remedy Selection

Based on the findings of the RI and FS, a Record of Decision (ROD) selecting a remedy for the site was issued by EPA on March 27, 1985. The remedial action is being conducted in one site-wide operable unit. The Remedial Action Objectives (RAOs) of the remedy include the following;

- Eliminate the future risk of contaminated groundwater ingestion by present and potential users in the vicinity of the site;
- Minimize the risk to the public from exposure to wastes and contaminated soils in the site area;
- Prevent the migration of contaminants from wastes left on the site; and
- Protect the public and on-site workers from health impacts resulting from the implementation of the remedial action.

The basic components of the remedy include the following;

- Excavation of 3,900 cubic yards of surface drums and contaminated soils for off-site disposal at a facility approved under the Resource, Conservation and Recovery Act (RCRA);
- Installation of a contaminated groundwater recovery and treatment system for the Bridgeton and Cohansey aquifers prior to reinjection or surface water discharge (determined during the design phase) with the goal to restore the groundwater to appropriate Federal and State standards; and
- Construction of a RCRA Subtitle C cap over the excavated dump area.

After the removal of soils and construction of the groundwater treatment system, the PRPs performed a number of soil investigations in the former disposal area. In October 1998, the PRPs

performed a soil study to determine if any source material remained on site that may pose a threat to human health and the environment. The soil sample results from this investigation is summarized in the May 1999 Soils Sampling Report.

Following a review of the results of the Soil Sampling Report, the PRPs performed additional soils sampling in June 2000 to delineate the nature and extent of the remaining source material found in the subsurface soils at the former disposal area. The analytical data, presented in the May 1999 Soil Sampling Report and August 2000 Soils Investigation Report, were utilized to develop the Soils Evaluation (SE) Report, dated September 2002. The SE Report provided a detailed analysis of the alternative methods to deal with the residual source material at the former disposal area, and the basis for modifying the soil remedy (RCRA cap) selected in the 1985 ROD. On July 3, 2003, EPA issued a ROD Amendment that changed the soils remedy from a RCRA cap to the treatment of contaminated subsurface soils by vapor extraction. The RAOs for the amended remedy include:

- Reduce or eliminate the risk of human exposure to the contaminated soils;
- Reduce or eliminate further contaminant migration from the soils to the groundwater; and
- Mass removal of contaminants in the site soils.

The major components of the amended soils remedy are as follows:

- Extraction of vapors contaminated with VOCs from the soils above the water table which exceed the cleanup levels;
- On-site treatment of extracted vapors prior to discharge to the environment; and
- Operation, maintenance and performance monitoring to ensure the effectiveness of the remedy. A monitoring program was developed to evaluate the effectiveness, optimize the operational parameters, determine the parameters for remedy closure, and confirm compliance with the cleanup goals.

On March 10, 2010, EPA issued an ESD to incorporate the CEA/WRA as a component of the site selected remedy. The CEA/WRA was established at the site to restrict the construction of all water supply well types within the area of the contaminated plume(s).

Remedy Implementation

Soil Removal:

From April to September 1985, EPA conducted remedial design activities for the excavation and removal of waste material from the former disposal area. EPA and the Army Corps of Engineers (ACE) began the on-site excavation and off-site disposal of buried drums and contaminated waste material on November 5, 1986. The removal of about 82 drums and 3,900 cubic yards of contaminated soils and disposal at an off-site, RCRA-approved facility, was completed in March 1987. The excavation area was subsequently backfilled, graded and vegetated with native plants.

Groundwater:

A groundwater investigation was carried out by the PRPs in two phases: Phase I (Bridgeton and Upper Cohansey Investigation) was completed in November 1994, and Phase II (Lower Cohansey Investigation) was completed in February 1996. Results are provided in the Phase 1 and Phase 2 Groundwater Investigation Reports dated April 1995 and June 1996, respectively.

In June 1995, the PRPs began construction of the groundwater remedy with the installation of the extraction and reinjection systems. Nine extraction and nine reinjection wells were installed. This work was completed in March 1996.

Between December 1995 and July 1996, the PRPs constructed the groundwater treatment plant. The treatment system consisted of five major processes - equalization and metals precipitation, suspended solids removal by clarification and granular media filtration, volatile organics removal by air stripping with air emissions controls, and sludge conditioning and handling.

During the final phase of construction, the PRPs submitted the Long-Term Groundwater Monitoring (LTGWM) plan; approved by EPA in March 1996. Sixteen new monitoring wells were installed and 19 existing wells were decommissioned by May 1996. The groundwater extraction, treatment and reinjection systems began operating in August 1997.

Following the completion of construction, the discharge to groundwater permit equivalency was finalized by NJDEP in August 1996. This permit equivalency included a CEA/WRA Notice that prohibits the drilling of water supply wells within the WRA and restricted all potable water supply wells for portions of properties near the site.

After collecting groundwater samples from the Lower Cohansey aquifer in November and December 1997, the PRPs submitted the Work Plan to Further Delineation of the Lower Cohansey Plume in February 1998. Three new monitoring wells were installed during the investigation conducted between March and July 1998. A final Lower Cohansey Plume Definition Report was submitted in August 1998.

A design/build approach work plan to expedite the Lower Cohansey extraction system construction was submitted by the PRPs in June 1998. One new extraction well and one new reinjection well was installed from August to November 1998. These wells began operating in April 1999. During the well installation, the LTGWM plan was revised in September 1998.

After seven years of groundwater monitoring, the PRPs proposed a supplemental groundwater investigation (SGI) at the site. A work plan was approved in June 2003 and field activities were conducted from August 2003 to March 2004. An SGI report submitted in June 2004 found that the Lower Cohansey plume had spread both laterally and vertically down-gradient.

Five new monitoring wells were installed in the Lower Cohansey in June 2004. These new wells along with five existing wells were sampled in August 2004. An additional monitoring well was installed in the Lower Cohansey in October 2004. All six new monitoring wells along with six existing wells were sampled in November 2004. The results of these activities can be found in the Lower Cohansey Plume Delineation Report submitted in January 2005.

An additional monitoring well and four observation well pilot borings were completed in the Lower Cohansey In May and June 2005. These new wells along with three existing wells were sampled in June 2005. The results were used to confirm the contaminated plume location and configure the new extraction wells proposed for the Lower Cohansey.

From August 2005 until January 2006, the PRPs conducted the Lower Cohansey extraction system enhancement (LCESE) activities. These activities consisted of installing four new extraction wells and one new reinjection well, and perform several other construction activities which are documented in a LCESE Certification Report dated April 2006.

After completing construction of the LCESE, the PRPs began integrating the new extraction and reinjection wells with the existing extraction system in January 2006, and was fully operational by February 2006. The PRPs revised the System Operation and Maintenance Plan in March 2007, and the LTGWM Plan in November 2007.

Because of the changes to the Lower Cohansey plume, the NJDEP required the PRPs to revise the 1996 CEA/WRA. Two new sentinel wells (MW-64 and MW-65) were installed within the existing Lower Cohansey monitoring well network from August to September 2010. No site contaminants were found in these wells. However, results from routine sampling conducted in August 2010 identified a small plume had completely separated from the larger Lower Cohansey plume. The details on the well installation and sampling, and small detached plume are provided in a Lower Cohansey Sentinel Well Report dated April 26, 2011.

Following a meeting with EPA in April 2011, the PRPs submitted a Lower Cohansey detached plume (LCDP) work plan in June 2011 which was approved by EPA in November 2011. This work plan details the development, construction and post construction activities for the installation of a new Lower Cohansey extraction well (LC-6E).

From August to September 2011, the PRPs installed a new monitoring well (MW-67) and observation well (OB-LC6E) on a nearby school property. Results from samples collected in September and November 2011 found site related contaminants were detected. The results are provided in the Technical Memorandum (No.1) for Location of New Extraction Well LC-6E submitted in November 2011. The Technical Memorandum (No.2) for Design of New Extraction Well LC-6E and the Engineering Design Package for the LCDP were submitted on November 21, 2011 and March 27, 2012, respectively.

As part of the approved LCDP work plan, the PRPs installed new monitoring well MW-66 in February 2012. Results from samples collected in March and April 2012 found site-related contaminants had migrated to the southwest of MW-60. These results are provided in the Analytical Data and Well Construction Log for MW-66 submitted in April 17, 2012.

The technical memorandums (No. 1 and 2) and engineering design were approved by EPA in May 2012 with the construction activities kicked off in June 2012. The conveyance and control systems were completed between June and November 2012, and the extraction well was installed in December 2012.

To complete LCDP delineation, the PRPs installed new monitoring well MW-68 in October 2012. Results from samples collected in October and November 2012 were similar to the contaminants detected in MW-60 and MW-66.

As a result of samples collected from wells MW-66 and MW-68, the PRPs concluded that LC-6E would not provide containment and cleanup of the LCDP and that additional delineation of the LCDP was required. A three-phased approach to delineate the remaining LCDP was proposed by the PRPs in March 2013. Phase 1 consisted of the installation and sampling of MW-69 which was completed in April 2013. After completing activities for MW-69, the PRPs submitted a work plan for the delineation of the LCDP in May 2013 which was approved by EPA in September 2013. Phase 2 consisted of the installation and sampling of three new monitoring wells (MW-70, MW-71 and MW-72) to delineate the down-gradient extent of the LCDP which were completed in February 2014. Phase 2 technical memorandum was submitted in March 2014. Phase 3 consisted of additional monitoring wells (MW-73 and MW-75) to be installed and sampled to delineate the remaining width and length of the LCDP which were completed in April 2014.

A review of the sample results from Phase 2/3 activities indicates that the LCDP delineation is complete. The PRPs are currently preparing a report that details the LCDP delineation activities and evaluates remedial options for addressing the LCDP to be submitted for EPA review and approval in July 2014.

Subsurface Soil:

EPA approved a remedial design report for soil vapor extraction in May 2004. It called for a vacuum to be applied to the subsurface using a blower and extraction wells. Air is drawn from wells causing flow through the soil, into the wells and air collection system and finally to the blower. Air flow from the blower is directed to a two-stage vapor phase granular activated carbon (VGAC) system for treatment before discharging to the atmosphere.

The system consists of eight active extraction wells, five passive air inlet/contingency wells and a utility building that houses all treatment equipment such as the 15 HP blower, knockout tank, piping manifolds/gauges, and carbon treatment units. The five passive wells allow fresh air to be introduced in the soil to improve the subsurface flow, and if the performance monitoring indicates that the eight active wells are insufficient in achieve the design criteria, the passive wells would be operated as active extraction wells. Figure 4 shows the configuration of wells. The treatment area is about 70 feet long by 60 feet wide by a depth of 15 feet with a volume of about 153,000 cubic feet. The primary treatment goal is physical removal of contaminant mass from the subsurface but some biological degradation occurs in the source area.

A work plan presenting a design/build approach for a simplified construction of the soil vapor extraction system was prepared by the PRPs and submitted in May 2004. EPA approved the final remedial action work plan and construction was completed in June 2004. EPA and the Corps attended a pre-final inspection in July 2004. The system has been operational since August 2004.

System Operations/Operation and Maintenance

Groundwater Remedy

The groundwater extraction, treatment and reinjection systems continue to be functional and operated by the PRP contractor de maximis, inc., and their subcontractors, Brown & Caldwell, and O&M, Inc. This system is currently treating (on average) about 140 gallons per minute (GPM) of contaminated groundwater through activated carbon units. A discharge to groundwater permit equivalency issued by NJDEP requires sampling of the treatment system on a monthly basis. Groundwater monitoring is also performed quarterly to ensure that the groundwater remedy continues to be effective in capturing each contaminated plume (see Figures 1-3). The requirements of this sampling effort are found in the November 2007 LTGWM Plan. Also, in accordance with the 2007 Operation and Maintenance Plan, the system undergoes monthly and quarterly operation and maintenance activities to ensure cleanup of the groundwater.

After the PRPs have completed developing a remedial alternative and engineering design to address the LCDP, the 2007 LTGWM and Operation and Maintenance Plan will be revised and submitted to EPA for review and approval. In addition, the 1996 CEA/WRA will also need to be revised and submitted to NJDEP for review and approval.

Subsurface Soil Remedy

The soil vapor extraction system continues to be functional and operational at removing vapors from the vadose zone. The air discharge permit equivalency issued by NJDEP requires the soil vapor system to be screened on a monthly basis using a photo ionization detector. Monthly performance monitoring is conducted and quarterly air samples are collected from eight vapor extraction wells. Based on the concentrations, the vacuum and flow rates are adjusted and extraction wells turned on and off periodically to change the subsurface flow patterns and allow for the measurement of rebound. Figure 4 shows thirteen vapor extraction wells which operate while routine maintenance activities are conducted to ensure cleanup of the subsurface soils.

From late 2009 to early 2010, groundwater levels at the site were observed rising during routine monitoring from the combination of heavier than normal snow and rainfall. By March 2010, the groundwater levels had risen above the well screens within the vapor extraction wells making it impossible to extract vapors from the subsurface soils. The PRPs notified EPA that the vapor extraction system would be shut down until the groundwater levels had receded in these wells. Groundwater levels were monitored weekly through June 2010 when the levels dropped allowing the system to be restarted and air samples collected from the influent stream. Sample results from the influent stream had increased from the previous year in June 2009 (20,058 micrograms per cubic meter [ug/m^3]) to the restart in June 2010 (24,490 ug/m^3). This rebound in concentration indicates that the system continues to effectively remove contaminants but the system could be near completion.

For the system to be considered complete, the remedial action objectives and soil cleanup goals must be achieved. To confirm whether the system has achieved the objectives and cleanup goals, a three-stage approach using performance monitoring requirements and verification sampling will be implemented. Stage 1 evaluates the total vapor stream concentration as it approaches stagnant levels. Stage 2 requires soil vapor samples to be collected during three separate shut down periods and the results compared to the remedy performance standards. Stage 3 calls for soil confirmation sampling. A more detailed description of these requirements can be found in the December 2004 Operations and Maintenance Manual.

With vapor stream concentrations approaching stagnant levels (See Figure 1), this first stage of performance monitoring is complete. The PRPs submitted an interim soil assessment work plan which was approved by EPA in March 2014. This work plan consist of collecting soil vapor and subsurface soil confirmation samples to complete the performance sampling. These activities are scheduled to begin in July 2014.

Progress Since Last Five-Year Review

The protectiveness statement from the first five year review indicated that: "The remedy is expected to be protective of human health and the environment, and, in the interim, exposure pathways that could result in unacceptable risks are being controlled. Excavation and removal of waste material and contaminated soils have reduced the source of groundwater contamination. Long term monitoring indicates that the groundwater extraction, treatment and reinjection system is effective in remediating the three contaminated aquifers (Bridgeton, and Upper and Lower Cohansey). These groundwater plumes have been defined. Recent investigation activities have defined the extent and nature of the LCDP and an evaluation of remedial options to implement are being developed for the LCDP. The CEA/WRA ensures that no drinking wells are installed within the area of the plumes. The final component of the remedy was amended to include vapor extraction and treatment of contaminants from the subsurface soils which continues to reduce the

source of contamination to the groundwater. Monthly performance monitoring indicates that the soil remedy is effectively remediating the contaminated subsurface soils."

There were no specific recommendations identified in the first FYR for the site. However, in March 2010, EPA issued an ESD that incorporated the CEA/WRA into the site remedy and investigations conducted since the last FYR have defined the extent and nature of the LCDP and a design for the remediation is underway.

Five-Year Review Process

Administrative Components

The five-year review team included Michael Zeolla (EPA-RPM), Michael Scorca (EPA-Hydrologist), Rebecca Ofrane (EPA-Human Health Risk Assessor), Mindy Pensak (EPA-Ecological Risk Assessor) and Pat Seppi (EPA-Community Involvement Coordinator). This is a PRP-lead site.

Community Involvement

The EPA Community Involvement Coordinator for the D'Imperio Property site, Patricia Seppi, published a notice in the Hammonton News, a local newspaper, on July 10, 2014, notifying the community of the initiation of the five-year review process. The notice indicated that EPA would be conducting a five-year review for the site to ensure that the implemented remedy remains protective of public health and the environment and is functioning as designed.

Once the five-year review is completed, the results will be made available in the local site repository, which is at the Hamilton Township Clerk's Office located at. In addition, efforts will be made to reach out to local public officials to inform them of the results.

Document Review

The documents, data and information which were reviewed in completing this five-year review are summarized in Table 3.

Data Review

Groundwater

The groundwater monitoring program includes monthly testing of the treatment system, and quarterly collection of water levels and groundwater quality samples to ensure the effectiveness of the extraction, treatment and reinjection systems in removing contaminants from the ground water. The monitoring program is undergoing changes due to the LCDP investigation activities, and after completing the remedial activities for the LCDP, the November 2007 LTGWM plan will be revised. All discharge permit limits are consistently met, and the monitored contaminants of concern continue to be reduced.

Currently, eight wells screened in the Bridgeton Aquifer are sampled semi-annually and six more wells are sampled annually. The groundwater plume in the Bridgeton Aquifer is delineated for total volatile organic compounds (TVOCs). TVOC is the total concentration of the VOCs listed in Attachment IV of the August 1993 Administrative Order. Of the 14 wells sampled in August 2013, ten had non-detects for TVOC and the four with TVOC detections are oriented along a

fairly linear path from the center of the site. Well BR-3E is the most downgradient extraction well and it showed the highest TVOC concentration in the Bridgeton aquifer during 2013.

Observations of water-quality trends in the Bridgeton well network indicates that the areal extent and magnitude of TVOC concentrations have decreased since operations began in August 1997. The major exception to this trend occurred in early 2010 during a period of high precipitation which raised groundwater levels. During this time, the rise in groundwater levels caused some contamination remaining in the subsurface soils to mobilize. Extraction wells, BR-2-E, BR-3-E, and BR-4-E, along with monitoring wells MW-43 and MW-52 showed higher than previously observed TVOC concentrations. These TVOC concentrations have now declined from double digits in 2010 to non-detected levels in 2013/2014.

The current monitoring network for the Upper Cohansey aquifer consists of 20 monitoring and 5 extraction wells. The TVOC concentrations in the Upper Cohansey aquifer have also declined with time. Wells MW-24-2R, UC-4E, MW-28-2, and UC-6E have TVOC concentrations less than 100 micrograms per liter (ug/L) in recent years. Well UC-3E has exceeded 100 ug/L only one time since 2010. The extent of the plume also remains relatively narrow.

The monitoring well network in the Lower Cohansey aquifer consists of 28 monitoring, 4 observation, and 6 extraction wells. Observations of the TVOC trends in the monitoring wells indicate that the main body of the plume has decreased in width. In particular, perimeter and side gradient wells MW-50, MW-51, MW-53, MW-54, and MW-58 had non-detections in 2013. Within the main body of the Lower Cohansey plume, the most recent trends of TVOC concentrations are generally decreasing or stable, with the exception of well MW-45. In several plume wells over the past few years, concentrations were observed to rise to a peak, which was then followed by a decreasing trend. A peak was observed in MW-29-2 during 1998, MW-33-2 during 2004, MW-46 during 2010, and MW-47 during 2007. This pattern illustrates the progression of the highest contaminant mass in the Lower Cohansey plume as it migrates downgradient through the monitoring wells and toward the line of extraction wells.

Following the observations of plume migration in the Lower Cohansey aquifer and further investigations in 2004 and 2005, the extraction system was modified to include four more downgradient extraction wells in 2006. An additional detached portion of the plume was observed downgradient of these extraction wells in 2010 and 2011 and investigated from 2012 through 2014. Temporary well borings and permanent wells were installed to complete delineation of the LCDP. The concentration trends show an increase followed by a significant decline in these wells. For example, at well MW-60 TVOC reached 193 ug/L in May 2010 and fell to 7 ug/l in August 2013. At well MW-66, the observed TVOC concentrations were 91 ug/L in November 2011 and 5 ug/L in August 2013. EPA will continue to monitor the LCDP to determine if further optimization is required.

Furthermore, beginning in 2006, 1,4 dioxane has been monitored in all three groundwater contaminated plumes. This contaminant was constantly observed in wells MW-43 (Bridgeton), MW24-2R and MW-28-2 (Upper Cohansey), and MW-32, MW-45, MW-47, MW-60, MW-68 and MW-69 (Lower Cohansey). Overall, the data shows that the concentrations have decreased in some of these wells. For example, at well MW-24-2R levels of 1,4 dioxane reached 430 ug/L in August 2006 to 110 in August 2013, and at well MW-60 from 50 ug/L in August 2007 to 4.7 ug/L in August 2013. Also, the effluent from the groundwater treatment plant was sampled and analyzed in July 2014 and the analytical results were below the NJDEP interim groundwater quality criteria of 10 ug/L for 1,4 dioxane.

As of December 2013, roughly 865 million gallons of water have been treated at the site. The treatment system is currently processing water at an average monthly pumping rate of about 140 GPM, and is effectively capturing the contaminated groundwater plume(s). Monthly effluent testing of the treatment system ensures that the remedy consistently meets the performance criteria established in the 1986 ROD. In addition, the influent (untreated water coming into the treatment system) is also sampled monthly.

During the extraction system modifications between 2005 and 2006, an additional pipeline (force-main) was installed to convey the expanded Lower Cohansey influent groundwater to the treatment system. Subsequently, samples were collected and reported for the combined Bridgeton-Upper Cohansey (BR-UC) influent and the Lower Cohansey (LC) influent. Figure 5 illustrates how these combined influent for TVOC concentrations have continued to decrease between February 2006 and December 2013. The trends illustrated in Figure 5 shows the range of TVOC concentrations in the influent from the Lower Cohansey have been fairly stable and that the large fluctuations in concentrations have been observed in the combined BR-UC influent. Following the peak in 2010 to 2011, which was related to the period of high groundwater level, concentrations have decreased significantly. Generally, the influent concentrations have been reduced to below 50 ug/L which is one of the important criteria for assessing groundwater cleanup as specified in the 1986 ROD. The other criteria will be to compare concentrations to the Federal MCL and NJGWQC.

In summary, the analytical data indicates that the TVOCs groundwater plumes for each aquifer (Bridgeton, Upper and Lower Cohansey) continue to decrease in size and concentration since the treatment began operating in August 1997.

Subsurface Soils

As of March 2014, the SVE system has removed over 47,000 pounds (lbs) of VOCs from the subsurface soils at the former disposal area. Since operations began in September 2004, the average annual VOC removal rate has decreased yearly from about 2,500 lbs/month in 2005 to 40 lbs/month in 2013. Figure 7 shows total VOC mass removed from the subsurface soils. This trend is typical for vapor extraction systems. The initial years of operation show a significant rate of removal followed by smaller changes through the subsequent years. The system is currently in its tenth year of operation.

For the past nine and half years, air samples were collected on a monthly basis during the first year and quarterly from the second year to the present at eight vapor extraction wells and the treatment system. A review of the analytical data collected shows a significant decrease in total VOC concentration from 29,487 ug/m^3 in September 2009 to 1,480 ug/m^3 in March 2014. Overall, five of the 8 vapor extraction wells were observed to have significant reduction in vapor concentrations. Table 4 shows the total vapor concentrations.

Between late 2009 and early 2010, on-site groundwater water levels were observed rising during routine monitoring which caused the vapor extraction system to be temporarily shut down between March and June 2010. After the system was restarted in June 2010, the vapor concentrations had rebounded in the subsurface soils. The vapor concentration in the influent stream had increased to 29,490 ug/m^3 (in June 2010) from 20,058 ug/m^3 (in June 2009). A rebound in concentration is typical during any extended downtime for a vapor extraction system. However, the rise water levels and system shutdown had little effect on the vapor concentrations because the average annual VOC mass removal rate had decreased from 60 lbs/month the previous year (July 2009) to 35 lbs/month the following year (July 2010).

The total vapor concentrations in the influent stream continues to show the contaminant mass is being removed but approaching stagnant levels. However, the system shutdown in September 2008 and between March and June 2010 caused the total vapor stream to increase in contaminant concentrations. Based on this data, the SVE system is continuing to operate, and in the interim, subsurface soil and vapor samples will be collected as part of a subsurface soil assessment work plan approved by EPA in March 2014. The data from these activities will be used to assess the current soil conditions and whether the remedial objectives and cleanup criteria have been achieved. The cleanup criteria established in the 2003 ROD Amendment are the New Jersey Impact to Groundwater Cleanup Criteria (IGSCC) and Residential Direct Contact Soil Cleanup Criteria (RDCSCC). These activities are scheduled to begin in July 2014.

Site Inspection

The inspection of the site was conducted on April 2, 2014. In attendance were Michael Zeolla, EPA Project Manager; Michael Scorca, EPA Hydrogeologist; Rebecca Ofrane, EPA Human Health Risk Assessor; Mindy Pensak, EPA Ecological Risk Assessor; Robert Darwin, PRP Project Manager from de maximis, inc.; Scott McMillian, PRP Geologist from Brown and Caldwell; Robert Gladstone, PRP Lead Attorney; Bob Casselberry, PRP Representative from Dow Chemical; and Mickey Faigen, PRP Public Relation Consultant from Issues Management, LLC. The purpose of the inspection was to assess the protectiveness of the remedy.

We met at the on-site trailers where the PRPs provided an update on the current groundwater investigation and upcoming interim soil remedy assessment/verification activities. This was followed by a tour of the groundwater investigation area, former disposal area and soil vapor extraction system. No issues were observed.

Interviews

During the FYR process, interviews were conducted with the participants of the site inspection, including the project manager and site geologist involved in site activities. The purpose of the interviews was to document any perceived problems or successes with the remedy that has been implemented to date. Interviews were conducted on April 2, 2014. The following items were discussed during the interviews: current conditions of the groundwater and soil contamination at the site, future activities to be implemented for the groundwater and soil remedies including the installation of new monitoring and extraction wells and performance sampling; past five years of groundwater and soil analytical data; and nature and extent of Lower Cohansey detached plume. No additional issues were identified.

Institutional Controls Verification

On March 10, 2010, EPA issued an ESD to incorporate the CEA/WRA as a component of the site selected remedy. The CEA/WRA was established at the site to restrict the construction of all water supply well types within the area of the contaminated plume(s). The requirements of the CEA/WRA can be found in the August 1996 Final Discharge to Groundwater Substantive Requirements. Several attempts have been made to revise the CEA/WRA. In 2007, following the completion of construction on the LCESE, two new Bridgeton sentinel wells were installed and most recently when two new Lower Cohansey sentinel wells (MW-64 and MW-65) were installed. Once remedial activities are completed for the Lower Cohansey detached plume, the PRPs will prepare and submit a revised CEA/WRA to NJDEP and EPA for review and approval.

Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

The remedies (consisting of soil removal, groundwater treatment, soil vapor extraction, and institutional controls) continues to function as intended by the 1985 ROD, 2003 ROD Amendment, and 2010 ESD. The CEA/ WRA requirement, which continues to protect against drinking water wells from being installed within the boundaries of the contaminated groundwater plume, was included as a component of the site selected remedy by the 2010 ESD.

A review of the analytical data over the last five years indicates that the groundwater treatment system (operating since August 1997) continues to meet the performance standards established in the 1993 Administrative Order. The extraction, treatment and reinjection system has continued to reduce the concentrations of contaminants within the plumes and the recent discovery of a small detached plume migrating from the larger Lower Cohansey plume is being delineated and remedial options are being developed. This remedy is being monitored through groundwater and effluent sampling.

Because the removal of contaminated soils and waste material did not eliminate the source of the groundwater contamination, a soil vapor extraction system over the former disposal area was installed in June 2004. Data collected since the last five year review indicates that the system continues to reduce the contaminant concentrations in the subsurface soils. Air samples collected over the past five years shows that the vapor concentrations are approaching stagnate levels indicating the system may be nearing the end of its usefulness. To verify that the system has achieved the remedial action objections and soil cleanup goals established in the 1993 ROD Amendment, a three phased approach to assess the system in the interim will be conducted during in the summer of 2014. The remedy effectiveness continues to be monitored through air samples collected at the extraction wells and treatment system.

Following the completion of remedial activities for the LCDP, the CEA/WRA will be revised to include the current groundwater conditions at the site and ensure that all water wells are not drilled within the plume area. In addition, the security fence around the property and treatment systems continues to prevent trespassers from walking on the property and possible damaging treatment system equipment.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy still valid?

The risk assessment methods used at the time of the RI did not calculate cancer risks or health hazards according to the current methodologies, but the process did identify the potential for human health risk based on the contaminants and their known toxicity at the time. There have been no changes to exposure pathways since the original assumptions. Land use, exposure routes and physical site conditions are the same. Contaminants of concern (COCs) have also remained the same, except for the addition of 1,4-dioxane, which has been identified in the plume since 2006. 1,4-Dioxane is primarily found in the Lower Cohansey aquifer, where concentrations have declined in most wells. Although concentrations have increased in MW-45 and MW-47, which correspond to increases in other contaminants, as discussed in the Data Review section above. The current NJDEP interim groundwater quality criterion for 1,4-dioxane is 10 µg/L, and while some wells have exceedances of the criterion, it was not detected above the current interim criterion in a sample collected from the effluent of the treatment plant in 2008 and again in July 2014. Overall, 1,4-dioxane will continue to be monitored at the site to confirm removal from the groundwater plume.

Groundwater restoration is the goal of the pump and treat remedy. The remediation goal for soils is the lower of the New Jersey RDCSCC or the IGSCC. The area is supplied by public drinking water and there is no contact with subsurface soils, so there are currently no complete exposure pathways.

The potential for vapor intrusion from contaminated groundwater has been periodically assessed at the site. In the 2009 FYR, it was noted that chloroform was detected in the shallow Bridgeton aquifer (within 40 feet below ground surface) exceeding its vapor intrusion screening value for groundwater. The screening value for groundwater has been updated since then (from 0.73 to 3.6 µg/L), and chloroform concentrations (maximum of 28 µg/L in 2013) in some of the Bridgeton aquifer wells still exceed this value. However, there is no development over the contaminated area, and chloroform has sporadic detections throughout the aquifers that may not be site related. Other contaminants in the plume aquifers are at depths that prevent any potential for vapor intrusion. Therefore, the vapor intrusion pathway remains incomplete throughout the site.

The extent of the ecological evaluation was completed as part of the alternative screening process in the FS. One of the alternatives was discharging treated water to a tributary of Babcock Creek called Adams Branch. This surface water body is located 3,000 feet to the north and upgradient of the site. An environmental assessment was completed to address the potential effects related to the surface discharge of treated water to Adams Branch and the surrounding wetland area. However, this alternative was not selected.

Only a limited ecological risk assessment was conducted at the time of the ROD; however, the excavation of contaminated soils and waste material along with the backfill of clean soil as a soil cover eliminates potential risk from surface soil contaminants to terrestrial ecological receptors within the excavation area. As there is no surface water in the immediate vicinity of the site and no groundwater to surface water pathway, there are no potential pathways to ecological receptors.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has surfaced that could call into question the protectiveness of the remedy.

Technical Assessment Summary

Based upon the results of this second five-year review, it has been determined that:

- The soil vapor extraction system continues to reduce the source of groundwater contamination at the disposal area;
- The groundwater treatment system continues to effectively contain the groundwater plume(s) while reducing contaminant concentrations;
- The remedy continues to meet the performance criteria established in the ROD and ROD Amendment; and
- Continued performance monitoring is necessary to evaluate the cleanup of the soils and groundwater.

Issues, Recommendations and Follow-Up Actions

There were no issues, recommendation or follow-up actions for this site.

Protectiveness Statement

Protectiveness Statement(s)	
Protectiveness Determination: Protective	*Addendum Due Date (if applicable):* Click here to enter a date.
Protectiveness Statement: *The remedy at OU1 is protective of human health and the environment, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. Excavation and removal of waste material and contaminated soils have reduced the source of groundwater contamination. The groundwater plumes have been defined and no drinking water wells are installed within the area of the plumes. Long-term monitoring indicates that the groundwater extraction, treatment, and reinjection system is remediating the three contaminated aquifers (Bridgeton, Upper and Lower Cohansey). In addition, periodic performance monitoring indicates the vapor extraction and treatment of contaminates in the subsurface soil continues to reduce the source of the groundwater contamination.*	

Next Review

The next five-year review report for the D'Imperio Property Superfund site is required in five years from the completion date of this review.

Tables

Table 1: Chronology of Site Events

Event	Date(s)
Illegal dumping discovery	1974/1976
NJDEP notifies EPA of waste disposal area	1981
EPA installs a security fence around disposal area	1982
Site placed on NPL	1983
ROD issued by EPA	1985
Remedial Investigation/Feasibility Study completed by EPA	1986
Excavation and off-site disposal of contaminated soils and waste material from former disposal area by EPA	1987
Groundwater design completed by EPA	1992
EPA issues UAO to PRPs to implement groundwater remedy	1993
EPA modified 1993 UAO for additional groundwater investigations	1993
Groundwater investigation completed by PRPs	1995
EPA issues supplemental UAO to additional PRPs	1995
Groundwater RA construction completion	1996
Groundwater treatment system is fully operational	1997
PRPs conducted subsurface soils investigation	1999
EPA modified 1993 UAO for additional subsurface soil investigations	2000
PRPs conducted subsurface soil delineation activities	2000
ROD Amendment issued by EPA	2003
EPA issues UAO to PRPs to conduct soil remedy	2003
PRPs soils remedy design completed	2004
SVE system is fully operational	2004
Preliminary Close-out Report	2004
PRPs supplemental groundwater investigation completed	2005
Lower Cohansey extraction system enhancement is fully operational	2006
Initial five-year review	2009
ESD issued by EPA for inclusion of CEA	2010

Table 2: Remediation Goals for Groundwater (all concentrations in µg/L)			
Contaminants of Concern	**National Primary Drinking Water Standards (Federal MCLs)**	**NJ Groundwater Quality Criteria (NJGWQC)**	**Performance Standards**
Volatile Organic Compounds			
Benzene	5	1	5(a)
2-Butanone	---	300	100
Chlorobenzene	100	50	(b)
Chloroform	80	70	5(a)
1,1-Dichloroethane	---	50	(b)
1,2-Dichloroethane	5	2	5 (a)
1,1-Dichloroethene	7	1	5 (a)
1,2-Dichloroethene(total)	70	70	(b)
1,2-Dichloropropane	5	1	(b)
Ethylbenzene	700	700	(b)
Methylene Chloride	5	3	5(a)
Tetrachloroethene	5	1	5(a)
Toluene	1000	600	(b)
1,1,1-Trichloroethane	200	30	200
Trichloroethene	5	1	5(a)
Semi Volatile Organic Compounds			
Phenol[(c)]			300
Inorganic Compounds			
Arsenic	10	3	50
Chromium	100	70	Background
Copper	1300	1300	1000
Iron	300	300	300
Lead	15	5	50
Manganese	50	50	20
Mercury	2	2	2
Zinc	5000	2000	5000
Chloride	250,000	250,000	10,000
Sulfate	250,000	250,000	15,000
Conventional			
Biological Oxygen Demand			8000-10,000

Notes:

(a) Compounds with limits in the Administrative Order, Attachment IV.

(b) Compounds with the sum of (a) and (b) that shall not exceed 50 ug/L.

(c) Per agreement with EPA, this compound will only be monitored in the treatment effluent.

Table 3: Documents, Data and Information Reviewed in Completing the Five-Year Review

Document Title, Author	Submittal Date
Record of Decision, EPA	March 1986
Record of Decision Amendment, EPA	September 2003
Long-Term Groundwater Monitoring Plan, Brown & Caldwell	November 2007
Groundwater Operations and Maintenance Plan, Brown & Caldwell	2007
SVE Operations and Maintenance Manual, O&M, Inc.	December 2008
1st Five Year Review, EPA	July 2009
Annual Groundwater Monitoring Reports, Brown and Caldwell	2009-2013
Quarterly Groundwater Monitoring Reports, Brown and Caldwell	2009-2013
Operation and Maintenance Reports, Brown and Caldwell	2009-2013
Site Monthly Progress Reports, de maximis, inc.	2009-2013
SVE System Annual Operation Reports, O&M, Inc.	2009-2013
Lower Cohansey Sentinel Wells Report, Brown and Caldwell	April 2011
Lower Cohansey Detach Plume Remedial Action Work Plan	July 2011
Technical Memorandum No. 1-LCDP Proposed Location of LC-6E	November 2011
Technical Memorandum No. 2-LCDP LC-6E Construction	November 2011
Technical Memorandum No. 3-LCDP Engineering Design Documents	March 2012
Technical Memorandum No. 4-LCDP	May 2012
Technical Memorandum No. 5-LCDP Delineation Results	July 2012
Technical Memorandum No. 6-LCDP MW-68 Installation Results	March 2013
LCDP Delineation Work Plan	July 2013
SVE Interim Assessment Work Plan	March 2014

Table 4
Soil Vapor Extraction System
Total Volatile Organic Compounds (ug/m3)
D'Imperio Property Superfund Site

	SVE-1	SVE-2	SVE-3	SVE-4	SVE-5	SVE-6	SVE-7	SVE-8	Pre-Treatment	Post-Treatment
Aug-04	37,965,000	12,741,000	1,136,610	6,598,900	827,600	830,060	28,010,300	34,318,000	39,226,000	117,286
Sep-04	8,746,400	496,200	68,506,000	1,910,000	3,523,300	6,123,000	3,910,300	9,284,300	67,083,000	19,650
Oct-04								1,610,360		
Nov-04								494,360		
Jan-05	817,170	681,262	9,215,400	987,500	34,936	585,300	3,042,500	328,070	220,470	11,692
Feb-05	806,100	1,135,200	2,983,200	887,820	35,042	424,810	602,800	3,048,800	2,855,900	28,210
Mar-05	231,170	595,920	79,140	441,400	23,314	380,000	3,149,600	350,000	919,630	32,557
Jun-05	1,149	2,356	24,924	652,870	90,650	57,667	7,900	10,312	147,430	
Sep-05	752,500	2,930,200	2,742,200	997,490	35,995	592,000	4,251,100	5,029,600	2,371,600	55,340
Dec-05	98,470	785,360	3,892,500	93,260	20,105	65,205	940,870	605,700	538,000	
Apr-06	43,494	448,850	662,280	14,320	7,725	382,160	2,540,000	593,190	505,190	2,007
Jun-06	27,375	338,167	501,300	68,883	1,476	490,430	634,850	898,910	601,680	
Sep-06	13,476	481,200	568,500	54,042	799	336,300	603,500	606,380	517,900	2,678
Dec-06	4,055	195,500	35,248	16,906	2,094	225,640	45,768	329,190	2,326	
Mar-07	328	78,140	52,675	2,590	694	156,439	137,240	386,970	125,957	113
Jun-07	1,434	130,110	4,549	1,294	237	7,280	222,270	183,520	137,660	
Sep-07	3,792	27,632	58,034	3,551	1,079	10,673	69,084	374,220	44,276	1,009
Dec-07	353	28,680	140,490	1,172	114	9,279	21,357	35,550	8,186	
Mar-08	125	79	5,014	390	229	6,777	991	770	2,145	
Jun-08	200	15,329	19	113	54	2,331	7,420	28,179	7	
Sep-08	237	8,488	26	44,713	375	9,143	7,037	564,824	90,656	680
Dec-08	897	28,854	555,350	37,353	1,651	126,010	29,088	417,640	214,540	
Mar-09	42	5,341	37,930	119,430	22	8,283	725	64,130	8,133	1,971
Jun-09	288	19,869	15,870	16,789	205	15,430	9,005	34,906	20,058	
Sep-09	313	38,840	38,792	1,549	230	21,509	15,515	35,186	29,487	7,910
Dec-09	341	27,180	2,938	71	211	4,055	110,220	18,620	13,885	
Mar-10	No Sampling Conducted. Heavy Precipitation caused High Water Table Above the Extraction Well Screen									
Jun-10	1,158	41,290	1,532	74	1,100	9,375	10,626	188,000	29,490	
Sep-10	591	14,734	18,869	330,700	2,372	33,210	7,504	77,510	28,730	1,986
Dec-10	695	12797	57440	95160	383	5813	53280	245700	65740	
Mar-11	262	18,440	99,334	103,730	345	18,770	13,072	155,520	48,950	4,089
Jun-11	208	4,539	105,560	86,490	534	4,932	31,650	78,500	44,880	
Sep-11	118	7,904	112,780	47,030	1,376	4,930	72,560	218,100	94,690	8499
Dec-11	193	9,030	63,060	12,223	169	18,210	13,767	66,740	6,420	
Mar-12	162	7,975	6,313	2,281	138	3,992	12,531	11,660	6,627	33,952
Jun-12	198	5,829	29,825	1,758	132	10,972	14,153	59,025	139	
Sep-12	222	4,345	30,738	13,119	447	6,878	5,524	58,960	50,759	147
Dec-12	518	7,433	22,041	11,425	359	5,276	10,466	91,914	20,030	
Mar-13	433	1,290	74	46	186	5,368	9,659	3,434	2,208	22
Jun-13	220	5,297	157	228	144	927	6,197	4,947	390	
Sep-13	172	4,123	4,726	16,792	443	2,629	656	20,103	2,893	144
Dec-13	223	3,564	20,337	519	170	2,134	3,308	48,433	15,480	
Mar-14	112	2,182	113	312	86	4,238	1,708	1,580	1,480	11

Table 5
Groundwater Monitoring Wells
Total Volatile Organic Compounds (ug/L)
D'imperio Property Superfund Site

	MW-43	MW-24-2R	MW-28-2	MW-29-2	MW-32	MW-33-2	MW-51	MW-50	MW-47	MW-60	MW-66
Jun-98	3497	1116	496	282							
Sep-98											
Oct-98											
Dec-98	2506	907	442	626							
Feb-99											
May-99	3177	1313	181	428							
Sep-99											
Dec-99	2758	4423	149	592							
Mar-00											
Jun-00	632	400	396	571							
Sep-00											
Dec-00	1156	2405	433	360							
Mar-01											
Jun-01	1621	843	539	250							
Sep-01											
Nov-01	3292	906	538	379	268	130					
Apr-02					88						
Sep-02					179	184					
Oct-02	1670	87	572	258							
Dec-02					220	247					
Feb-03											
May-03	1317										
Aug-03	1272										
Nov-03	535										
Feb-04						327 J	153 J	104 J	41		
May-04	123 J	2297 J	144 J	149 J	95 J						
Aug-04							164 J	308 J	38.9		
Nov-04		660 J		158 J		461 J	89 J	377 J	37.9		
Feb-05											
May-05	44	612 J	349	148							
Aug-05											
Nov-05	69	790	174								
Feb-06				152	133 J	355 J		198 J			
May-06	21 J	233 J	134 J								
Aug-06	13 J	510 J	177 J	132 J	124 J	254 J	60 J	134 J	57 J		
Mar-07	3 J	392 J	81 J		420 J	255 J		110 J			
Aug-07	5 J	612 J	126 J	94 J	205 J	156 J	52 J	22 J	135 J		
Nov-07											
Feb-08	10 J	102 J	122 J	43 J	105	60 J		20			
May-08											
Aug-08	6 J	49 J	109 J	33 J	284 J	18 J	21 J	23	114 J		
Nov-08											
Feb-09	7 J	96 J	57 J	12 J	154 J	4 J		30 J			
May-09											
Aug-09	130 J	225 J	59 J	2 J	42 J	13 J	7 J	106 J	104 J	193 J	
Nov-09										150 J	
Feb-10	570 J	131 J	105 J	2 J	35 J	46 J		ND		200 J	
May-10										200 J	
Aug-10	1481 J	195 J	68 J	1 J	213 J	63 J	14 J	19 J	32 J	180 J	
Nov-10	452 J									132 J	
Feb-11	306 J	152 J	68 J	65 J	60 J	41 J		4 J		137 J	
May-11										155 J	
Aug-11	80 J	242 J	50 J	1 J	54 J	67 J	13 J	5 J	28 J	112 J	
Nov-11										76 J	91 J
Feb-12	36 J	3 J	17 J	ND	23 J	51 J		5 J		69 J	82 J
May-12										33 J	47 J
Aug-12	14 J	23 J	56 J	1 J	25 J	129 J	15 J	3 J	24 J	28 J	20 J
Nov-12										8 J	23 J
Feb-13	2 J	14 J	32 J	1	18 J	40 J		ND		12 J	16 J
May-13										12 J	13 J
Aug-13	1 J	36 J	39 J	ND	60 J	52 J	19 J	ND	35 J	7 J	5 J
Nov-13											

Figures

Figure 1 - Bridgeton Sand Aquifer Well Network

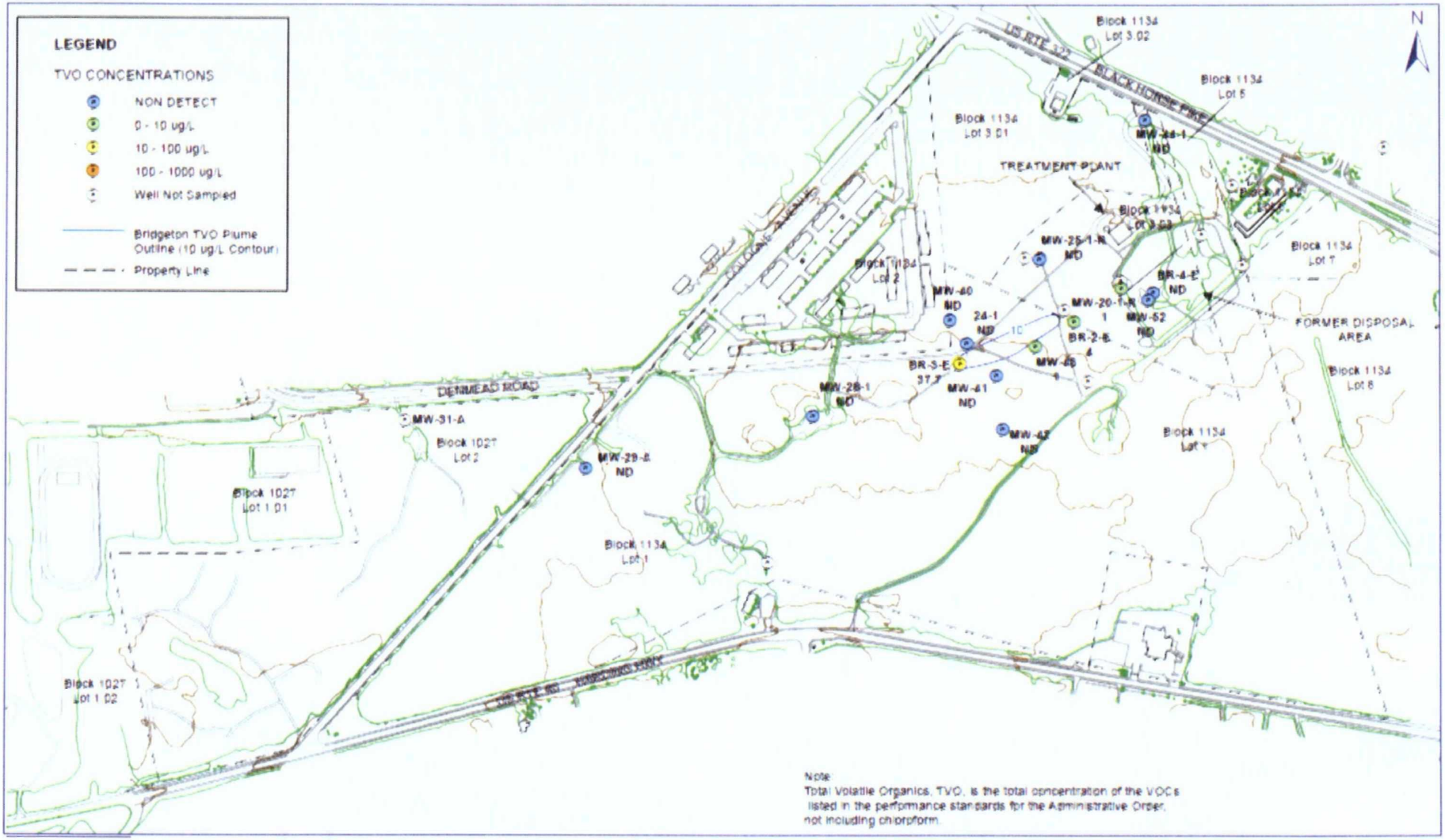


Figure 2 - Upper Cohansey Sand Aquifer Well Network

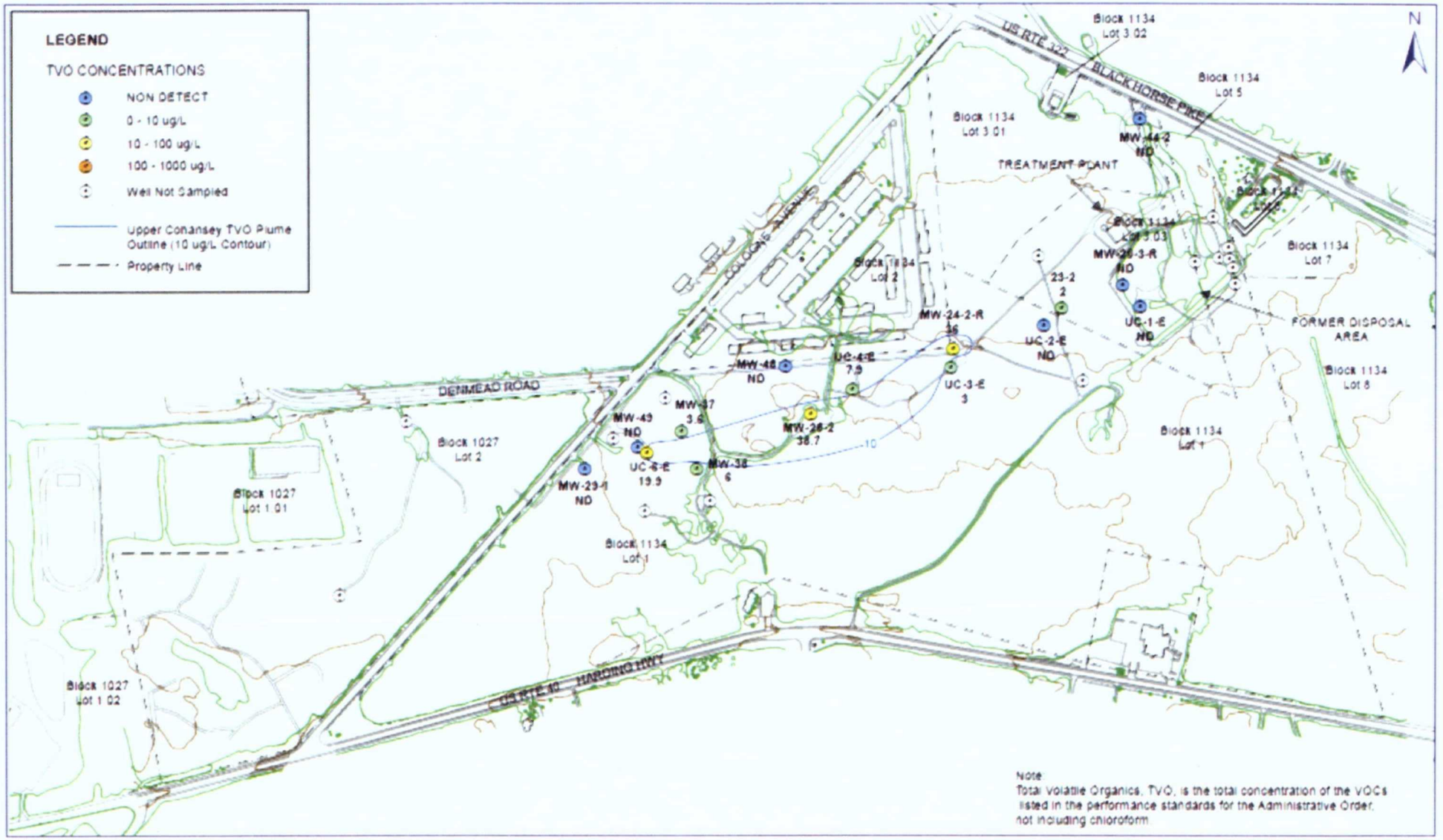


Figure 3 - Lower Cohansey Sand Aquifer Well Network

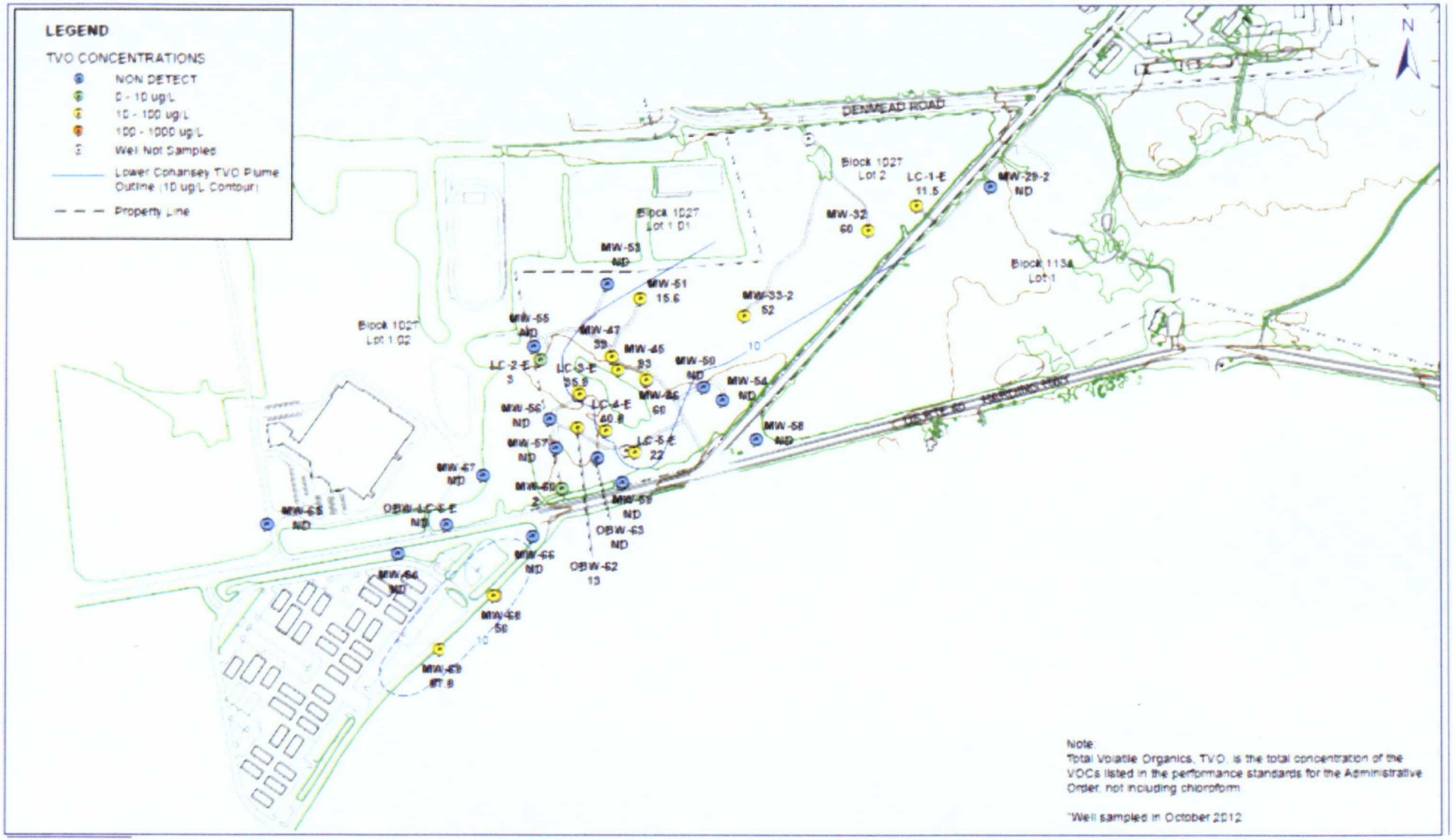


Figure 4 – SVE Well Location

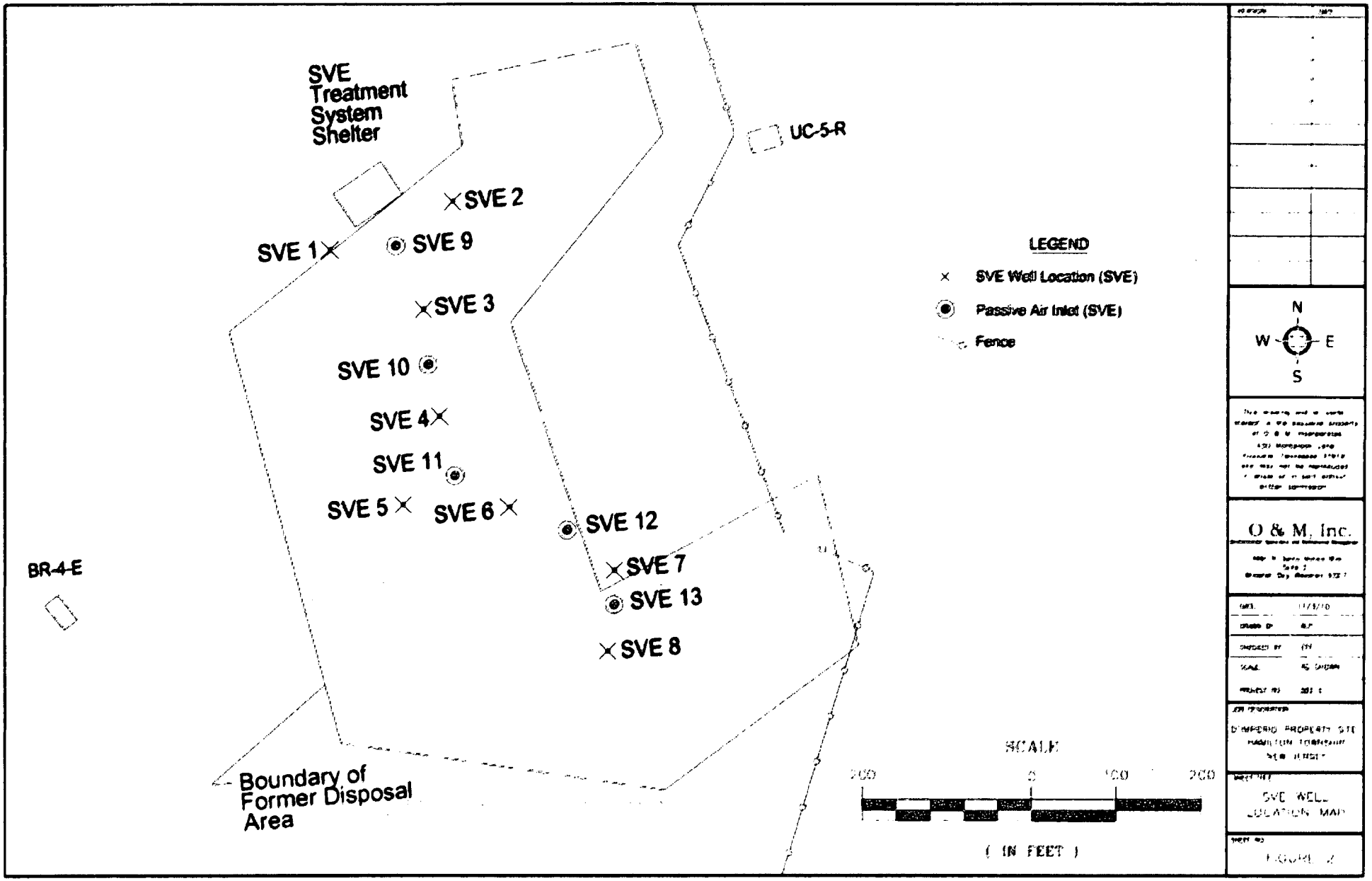
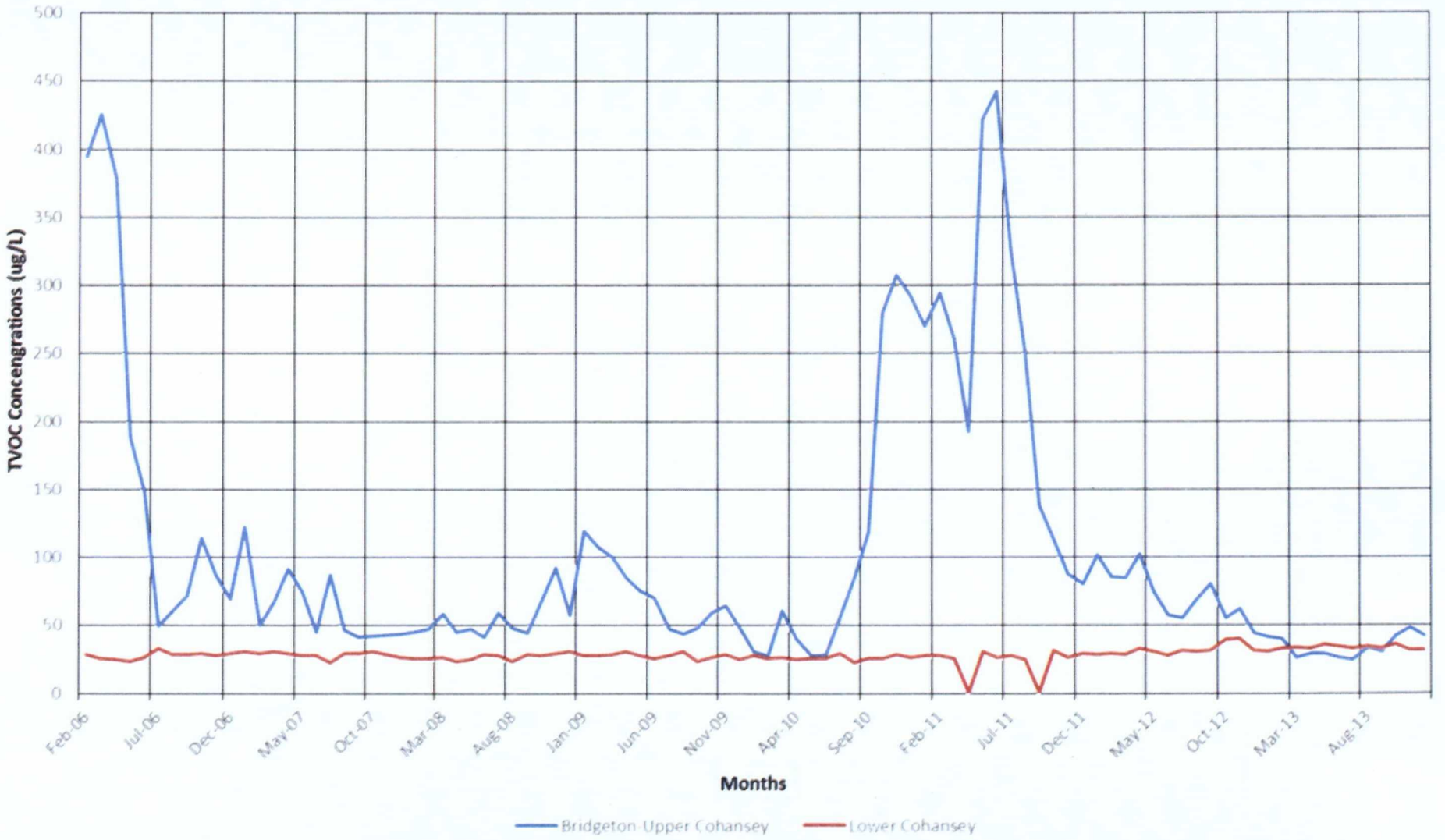
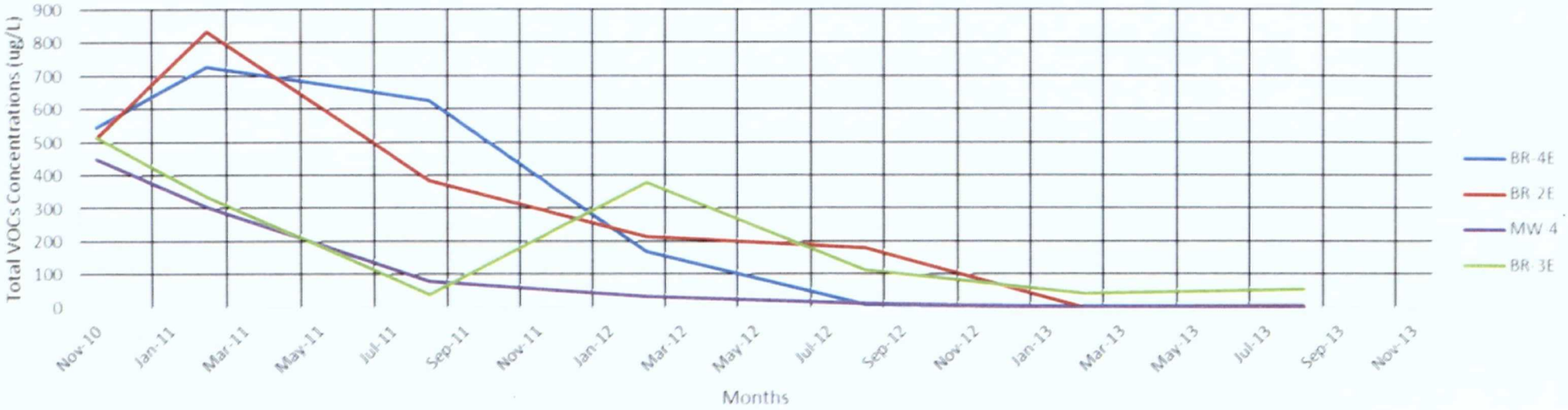

SVE Treatment System Shelter
UC-5-R
SVE 2
SVE 1
SVE 9
SVE 3
SVE 10
SVE 4
SVE 11
SVE 5
SVE 6
SVE 12
SVE 7
SVE 13
SVE 8
BR-4-E
Boundary of Former Disposal Area
LEGEND
SVE Well Location (SVE)
Passive Air Inlet (SVE)
Fence
N
W
E
S
O & M, Inc.
SCALE
200
0
100
200
(IN FEET)
SVE WELL LOCATION MAP
FIGURE 2

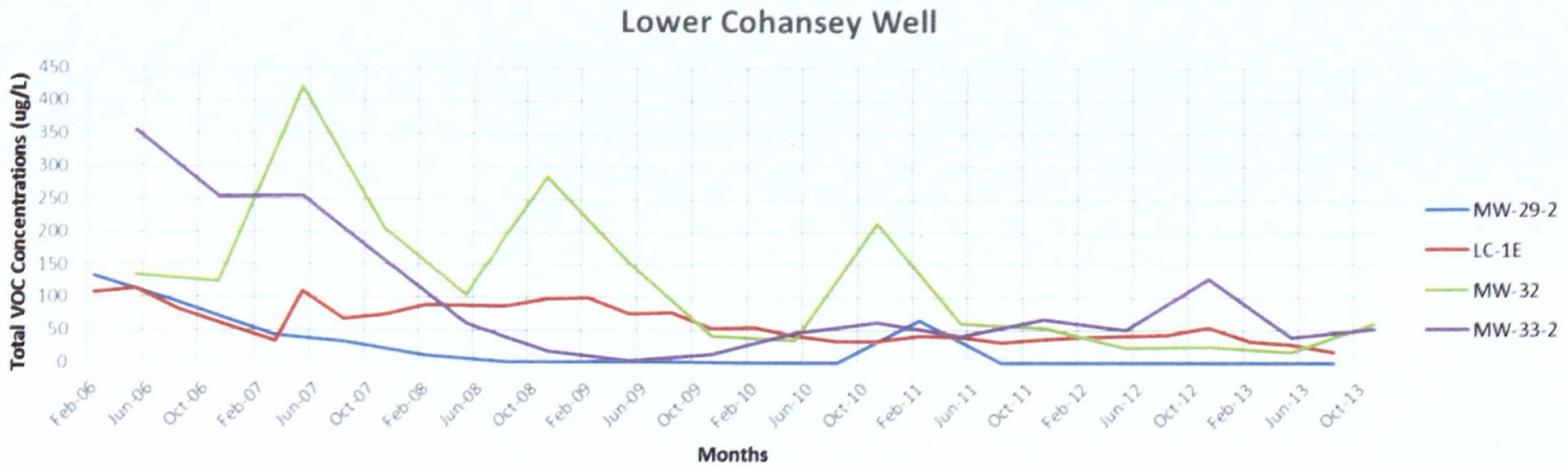
Figure 5
Total VOC for Combined Bridgeton and Upper Cohansey and Lowere Cohansey

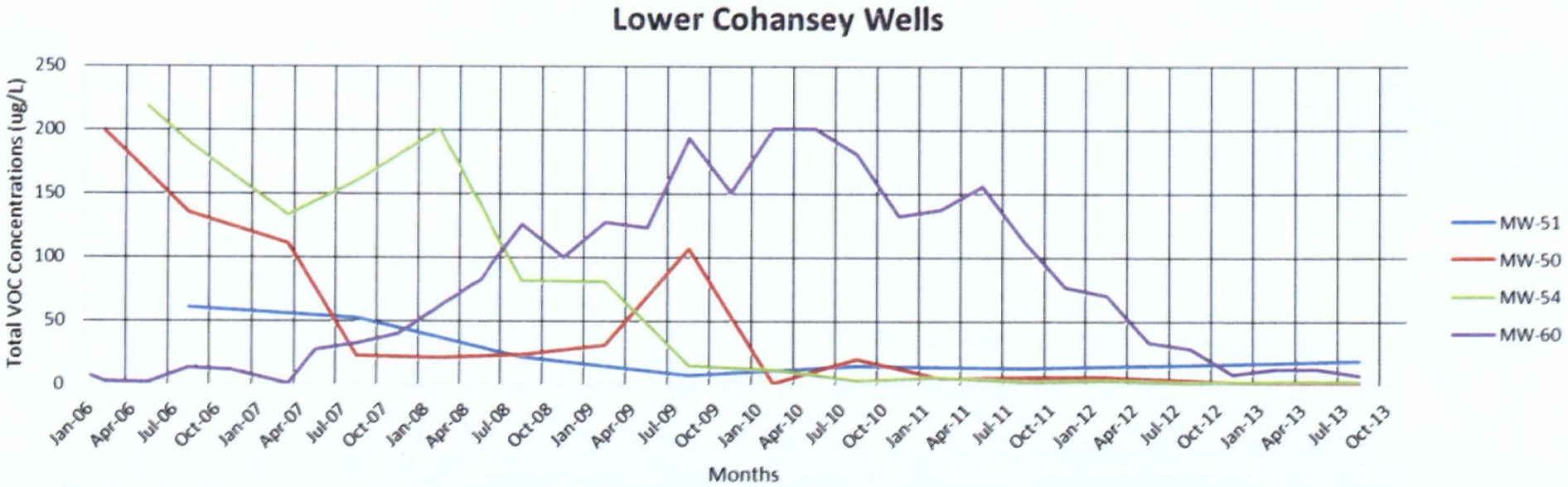


Bridgeton Sand Wells



Upper Cohansey Wells


Lower Cohansey Well
Total VOC Concentrations (ug/L)
450
400
350
300
250
200
150
100
50
0
Feb-06
Jun-06
Oct-06
Feb-07
Jun-07
Oct-07
Feb-08
Jun-08
Oct-08
Feb-09
Jun-09
Oct-09
Feb-10
Jun-10
Oct-10
Feb-11
Jun-11
Oct-11
Feb-12
Jun-12
Oct-12
Feb-13
Jun-13
Oct-13
Months
MW-29-2
LC-1E
MW-32
MW-33-2


Lower Cohansey Wells
Total VOC Concentrations (ug/L)
250
200
150
100
50
0
Jan-06
Apr-06
Jul-06
Oct-06
Jan-07
Apr-07
Jul-07
Oct-07
Jan-08
Apr-08
Jul-08
Oct-08
Jan-09
Apr-09
Jul-09
Oct-09
Jan-10
Apr-10
Jul-10
Oct-10
Jan-11
Apr-11
Jul-11
Oct-11
Jan-12
Apr-12
Jul-12
Oct-12
Jan-13
Apr-13
Jul-13
Oct-13
Months
MW-51
MW-50
MW-54
MW-60